Tensile Properties of Pandanus Atrocarpus based Composites

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Abstract

Pandanus atrocarpus, or locally known as mengkuang plant is likely to be potential natural fibre reinforcement in composite. Both the Pandanus leaves, and fibres extracted from the Pandanus leaves were used in composite fabrication. Fibres were extracted from Pandanus leaves with water retting process. Pandanus composites were laminated using compression moulding method. The tensile properties of composite laminates based on lamination of Pandanus leaf- and extracted Pandanus fibre-reinforced polyethylene were investigated. Tensile tests have shown that composite laminates based on extracted Pandanus fibre reinforced polyethylene were more superior than using the Pandanus leaf itself without extracting its fibre. Tests exhibited that increasing the volume fraction of Pandanus fibre resulted in strength increase. This suggests that Pandanus fibre- based composites could offer a range of mechanical properties for use in the engineering industry.

Keywords: *Pandanus atrocarpus, natural fibre, tensile, polyethylene.*

1. Introduction

The year 2009 has been appointed by the United Nations to be the international year of natural fibres. This indicates the significant of the usage of natural fibres in the history of human development. Natural fibres have long been utilised since the ancient world. People used natural fibres to meet their basic necessity, such as in textiles, clothing, housing appliances and building materials. The usage of green fibres depends on the quantities of local production or natural resources of the location. Natural fibres were used in ancient Egypt some 3000 years ago, when clay was reinforced by straw to build walls [1]. Kvavadze *et al.* [2] have also reported that man used flax fibres in prehistoric times for weaving baskets and sewing garments in caves in Georgia more than 30,000 years ago.

The usage of natural fibres can be found widely in a variety of industries, such as in automotive, aerospace, building, plastic and textile. One of the noticeable applications of natural fibres is to replace synthetic fibres or man-made fibres as reinforcement in the composite production. There has also been an increasing interest in the use of polymer fibre composites reinforced natural fibres. Polymer composites have widely been applied due to the benefits they possess, such as light, cheap and ease of fabrication. Natural fibres have less environmental impact compare to synthetic fibres. The biodegradable natural fibres are economic viability, low density, enhance energy recovery, ease of separation, reduce dermal and respiratory irritation, good specific strengths and modulus [3-5]. Research and studies done on natural fibres used as reinforcement in composite has shown promising results [6-7]. The aim of the work presented here is to investigate the possibility of using *Pandanus atrocarpus* reinforced thermoplastics polyethylene to produce a lightweight composite panel. The composites were manufactured by using both Pandanus leaves, and fibres extracted from Pandanus

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